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10/714,336

11/13/2003

Kenny Chang

JCLA11475

4087

23900

7590

10/24/2006

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EXAMINER

ARENA, ANDREW OWENS

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 10/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/714,336

Applicant(s)

CHANG ET AL.

Examiner

Andrew O. Arena

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

Claims 24-26, 28, 30-33, 35, 37-39, 41, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao (US 6,316,828) in view of Stearns (US 5,895,967), Davidson (US 2003/0232463), and Yamaura (US 6,831,360).

All rejections based on Tao refer to Fig 6; examiner has attached a copy of Tao Fig 6, to which has been added two reference numerals (E1, E2) used for clarity.

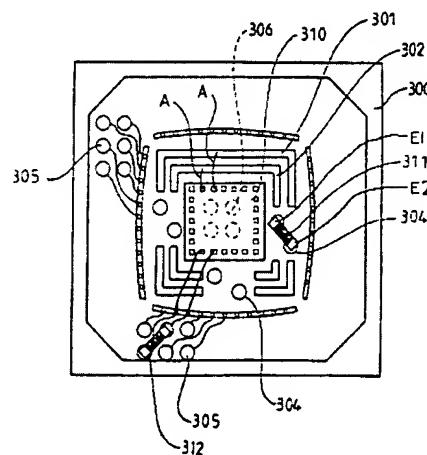


FIG. 6

Re claims 24, 31, & 38, Tao discloses a package substrate (300; col 3 ln 41) adapted to carry a die (310; col 3 ln 46-48) of a wire bonding type (A; col 3 ln 37-38), the package substrate at least comprising:

a substrate (300; col 3 ln 41) having a surface, a power pad (301; col 3 ln 45-46) and a ground pad (302; col 3 ln 46), wherein the surface of the substrate has a die bonding area (310), and wherein the power pad and the ground pad are disposed outside the die bonding area;

at least one passive component (311; col 3 ln 42 - see Fig 5) disposed between the power pad and the ground pad (clear in Fig 6), wherein the passive component has a power electrode (E2) connected to the power pad and a ground electrode (E1) connected to the ground pad (col 3 ln 44-46);

a wire (leftmost A) connecting (electrically) the die bonding area (310) and one electrode (E1) and not crossing over the passive component (311);

a first continuous layer on the exposed surface of the power electrode and the exposed surface of the power pad (col 3 ln 44; Fig 1: terminals of 102); and

a second continuous layer on the exposed surface of the ground electrode and the exposed surface of the ground pad (col 3 ln 44; Fig 1: terminals of 102).

Tao differs from the claimed invention in not disclosing a signal pad.

Stearns discloses (Fig 4) a package substrate (62) adapted to carry a die (50; col 6 ln 56) having power, ground, and signal pads (col 6 ln 56-57) connected to corresponding power (46 & 26; col 6 ln 63), ground (44 & 24; col 6 ln 61-62), and signal (48 & signal connection; col 6 ln 64-65) pads on the substrate, all pads disposed outside the die bonding area.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made that the plurality of connection pads on the substrate of Tao include a signal pad, as taught by Stearns; at least for signal communication with the chip.

Tao differs from the claimed invention in not expressly disclosing the material of the continuous layers.

Davidson discloses (Fig 2) a package substrate (7; ¶21 ln 1-2) adapted to carry a die (8; ¶21 ln 1), comprising a solder (10; ¶21 ln 2), and teaches the solder may be, *inter alia*, gold, nickel (¶21 ln 6), or a gold-nickel-alloy (¶21 ln 6-8).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made that the continuous layers of Tao be gold (for claim 24), nickel (for claim 31), or gold-nickel-alloy (for claim 38), as taught by Davidson; at least since selection of a suitable material is within the skill level of an ordinary artisan.

Tao as modified by Stearns differs from the claimed invention in not expressly disclosing a third layer on the exposed surface of the signal pad.

Yamaura discloses (Fig 3b) a metal layer (4b; col 10 ln 7-8) formed on all the substrate pads (4a; col 10 ln 7-9).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made that the continuous layers of Tao be formed on the exposed surface of the signal pad, as suggested by Yamaura; at least to enhance contact conductivity.

Re claims 25, 32, & 39, Tao discloses a patterned solder mask layer disposed the surface of the substrate (col 3 ln 20-22, 41), and exposing surfaces of the power pad and the ground pad (304, 305; col 3 ln 20-22).

Tao as modified by Stearns discloses a signal pad.

Tao as modified by Stearns differs from the claimed invention only in not expressly disclosing the patterned solder mask exposes the surface of a signal pad.

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It would have been obvious to a person of ordinary skill in the art at the time the invention was made to expose the surface of said signal pad; at least to use said pad.

Re claims 26 & 33, Tao discloses a patterned solder mask layer disposed the surface of the substrate (col 3 ln 20-22, 41), wherein the patterned solder mask layer has at least one opening (304; col 3 ln 20-22).

Re claims 28, 35, & 41, Tao discloses the passive component (311) is a capacitor (Fig 4).

Re claims 30, 37, & 43, Tao as modified by Stearns differs from the claimed invention only in not expressly disclosing the location of the signal pad.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made that the power pad is between the ground pad and the signal pad; at least because selecting location of parts is within the skill level of an ordinary artisan.

Claims 27, 34, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao in view of Stearns, Davidson, and Yamaura, as applied to claims 24, 31, and 38 above, respectively, and further in view of Liu (US 6,713,836).

Re claims 27, 34, & 40, Tao differs from the claimed invention only in not expressly disclosing the passive component is an inductor.

Liu discloses (Fig 3&4) a package substrate (col 2 ln 41-44) adapted to carry a die (206; col 2 ln 46) and comprising at least one passive component (224; col 2 ln 43, col 3 ln 16), wherein the passive device is an inductor (col 3 ln 21).

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It would have been obvious to a person of ordinary skill in the art at the time the invention was made that at least one passive component of Tao is an inductor, as taught by Liu; at least to improve the electrical properties (Liu: col 3 ln 20-22).

Claims 29, 36, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao in view of Stearns, Davidson, and Yamaura, as applied to claims 24, 31, and 38 above, respectively, and further in view of Brownfield (US 6,683,387)

Re claims 29, 36, & 42, Tao differs from the claimed invention only in not expressly disclosing the material of at least one electrode.

Brownfield discloses (Fig 2) a package substrate (22; col 3 ln 38) adapted to carry a die (IC; col 5 ln 6) or a passive component (col 5 ln 7), and discloses the passive component has at least one electrode made of Sn-Pb alloy (col 5 ln 6).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made that the passive component of Tao have at least one electrode made of Sn-Pb alloy, as taught by Brownfield; at least for easy solder bonding.

Response to Arguments

Applicant's arguments filed 08/21/2006 have been fully considered but they are not persuasive.

Tao discloses (Fig 6) the bonding wire (A) electrically connects the die bonding area (310) and one electrode (E1) and does not cross over the passive component.

Examiner submits that the claimed invention does not define over the applied art.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Liu discloses (Fig 5) a bonding wire (228, col 3 ln 35) that electrically connects the die bonding area (230, col 3 ln 33; 202, col 2 ln 44) and one electrode (226; col 3 ln 16-17) without crossing over the passive component. Liu also discloses (Fig 5) another bonding wire (third from bottom) similar to applicant's disclosed (Fig 2C) wire (238).

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

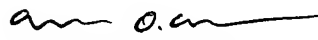
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

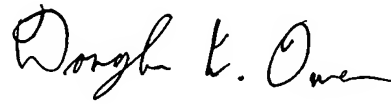
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew O. Arena whose telephone number is 571-272-5976. The examiner can normally be reached on M-F 8:30-5.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard T. Elms can be reached on 571- 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Andrew O Arena
19 October 2006

 10/23/06
DOUGLAS W. OWENS
PRIMARY EXAMINER